6. On the Anatomical Differences in the three Species of *Rhea*. By Hans Gadow, Ph.D., M.A. Cambridge.

[Received March 17, 1885.]

In the spring of 1883 the Museum of the University of Cambridge received from the Zoological Society of London two specimens of *Rhea darwini* and one of *Rh. macrorhyncha*, with the understanding that I should compare examples of the three species of *Rhea* hitherto known with each other, and point out their anatomical differences, provided there were any. The comparison made in the following pages must, however, necessarily be incomplete, because some of the specimens were imperfect and were of different ages and sexes. The material at my disposal was the following :—

One specimen of *Rh. macrorhyncha*, immature, with most of the viscera removed previously.

One specimen of *Rh. darwini*, ♂, not quite adult ; skeleton and viscera complete.

One specimen of *Rh. darwini*, ♀ ; skeleton complete, viscera partly removed previously.

Rh. americana. Several skeletons and preparations of visceral parts in the collections of the Universities of Cambridge and Heidelberg, and in the Museum of the Royal College of Surgeons of England.

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——. On the Conformation of the Thoracic End of the Trachea in the "Ratite" Birds. P. Z. S. 1881, p. 778.

Skeleton.

Comparison of the skulls *in toto* (see pp. 310, 311) shows at a glance that the long-billed feature of *Rh. macrorhyncha* is less due to a larger or stronger bill than to the narrower, more slender shape of the whole skull. In order to explain this, the following measurements have been taken :—

ad. The length of the mandible from the hindermost upper angle of the os angulare to the tip of the os dentale.

oe. Direct distance between the middle of the occipital region (on the outer surface of the skull) to the anterior end of the ethmoidal region, at the point *.

ep. Distance from * to the tip of the os premaxillare.

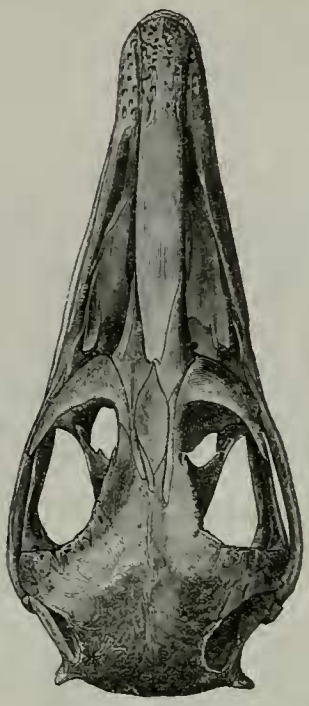
jug. Greatest outer distance between the two jugal arches.

	oe.	*ep.*	*ad.*	*jug.*
	mm.	mm.	mm.	mm.
Rhea americana	89	91	162	75
—— *macrorhyncha* .	76	76	140	55
—— *darwini*, ♀	80	71	135	

This table shows that the distance *ep* (corresponding fairly with the length of the bill) in *Rh. macrorhyncha* equals that of *oe*, whilst in *Rh. americana* it is rather longer, and in *Rh. darwini* considerably shorter. The latter species has therefore the proportionately shortest, *Rh. americana* the longest "bill." However, the name of *Rh. macrorhyncha* is less unjustifiable if we consider the width between the two jugular arches at the point of their greatest distance, the latter being 75 millim. in *Rh. americana*, and only 55 millim. in *Rh. macrorhyncha* ; whilst in proportion to the total length of the skull, it should measure 65, or in proportion to the distance *ep* 63, instead of 55 millim. Owing to this formation the skull of *Rh. macrorhyncha* has a much more slender appearance.

According to Cunningham, the lachrymal bones constitute an important distinctive character between the Common and Darwin's Rhea. In his specimen of the Common Rhea, the descending anterior orbital process of the lachrymal bones was deeply notched, whilst in *Rh. darwini* this notch was converted into a large foramen by another bar of bone, for the reception of one of the orbito-nasal air-sacs. I found, however, this foramen besides in the two specimens of *Rh. darwini*, likewise in the adult *Rh. americana*, but a deep lateral notch (like that figured by Cunningham, P. Z. S. 1871, pl. vi. fig. 1) in *Rh. macrorhyncha*. The Cambridge specimens of *Rh.*

Fig. 1.



Skull of *Rh. americana*, $\frac{2}{5}$ natural size. Upper surface.

Fig. 2.

Fig. 3.

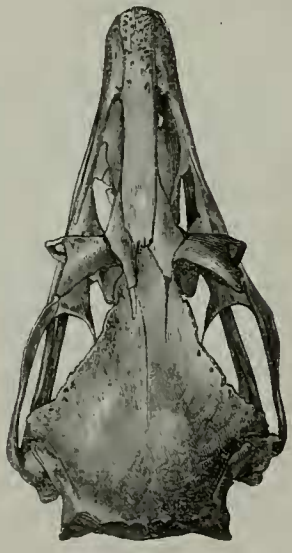
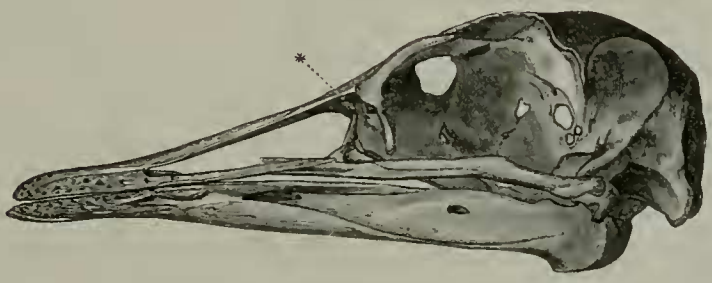


Fig. 2. Skull of *Rh. macrorhyncha*, $\frac{2}{5}$ natural size. Upper surface.
Fig. 3. Skull of *Rh. darwini*, $\frac{2}{5}$ natural size. Upper surface.

americana possessing this foramen reduce its presence or absence to an unimportant individual variation.

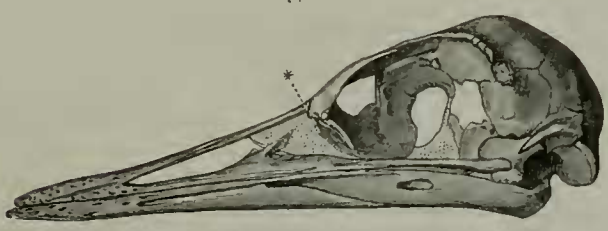
Regarding the vertebral column, the three species exhibit some

Fig. 4.



Skull of *Rh. americana*, $\frac{2}{5}$ natural size. Side view.

Fig. 5.



Skull of *Rh. macrorhyncha*, $\frac{2}{5}$ natural size. Side view.

Fig. 6.

Skull of *Rh. darwini*, $\frac{2}{5}$ natural size. Side view.

highly interesting differences, which would be of great importance if we could be certain that they are not due to individual variation.

The differences are shown in the following tabular arrangement :—

Serial number of vertebræ.	*Rh. americana.*	*Rh. darwini.* ♀.	*Rh. darwini.* ♂.	*Rh. macrorhyncha.*
15..... ..	Last cervical or transitional rib .	Last cervical or transitional rib.		[trans. rib.
16.....	Free rib	Free rib		Last cervical or
17.....	1st sternal rib[1] ...	Free rib		Free rib.
18.....	2nd „ ...	1st sternal rib		Free rib.
19.....	3rd „ ...	2nd sternal rib		1st sternal.
20.....	4th „ ...	3rd sternal rib		2nd sternal.
21..... ..	1st lumbar	1st lumbar		3rd sternal.
22.....	2nd „	2nd lumbar		1st lumbar.
23.....	3rd lumbar, ankylosed with ilium .	3rd lumbar, ankylosed.		2nd lumbar.
24.....	....	.....		3rd lumbar.
25.				
26..... 27.....	Acetabular process	Acetabular processes ...		Acetabular.
28..... 29.....	....			
30..... 31..... 32.....	No transverse processes connecting the ilium with the vertebral column.			No transverse processes.
33..... 34.....	The two primitive sacral vertebræ.			
35.				
36.....	Last connection with ilium.			
37.....	.....			Last connection with ilium.

The postsacral region, beginning with the 37th or 38th vertebra respectively, shows in all the specimens the almost complete resorption of the vertebral column which is typical and so remarkable of the genus *Rhea*. In *Rh. americana* and in *Rh. darwini* the first 14 cervical vertebræ possess, with the usual exception of the atlas and epistropheus, the typical avian cervical ribs, which ankylose firmly with the dorsal and ventral lateral processes of their vertebræ; their distal sharply-pointed ends are directed parallel to the long axis of the vertebral column. The 15th vertebra carries a short (about 2–3 centim. long), thick and blunt, not moveable, rib. We will call this rib the *intermediate* or transitional one, because it forms the transition from the cervical to the thoracic ribs, or it may also be called pseudo-cervical. Then follow 8 long ribs, of which in our two specimens of *Rh. darwini*, in Dr. Cunningham's *Rh. darwini* and *Rh. americana*, and in Prof. Mivart's *Rh. americana*, the first two do not reach the sternum, wanting the sternal connecting

[1] Cunningham says that in the two specimens of *Rh. americana* and *Rh. darwini* examined by him but three ribs (the third, fourth, and fifth) were connected with the sternum. The same is the case with the specimen of *Rh. americana* in the Royal College of Surgeons examined by Prof. Mivart. The Heidelberg and the Cambridge specimens of *Rh. americana* possess four pairs of sternal ribs, each of which is furnished with an uncinate process. The number of sternal ribs is therefore subject to individual variation. About four or five of the neck-vertebræ were wanting in Cunningham's specimen of *Rh. darwini*.

portion. These ribs are therefore anterior pseudo-thoracic. The last three ribs of the whole number of eight are in all Rheas likewise not connected with the sternum—true lumbar or posterior pseudo-thoracic ribs. The skeletons of the American Rhea in the Cambridge and Heidelberg Museums have each four pairs of true sternal ribs, each being furnished with an uncinate process.

Rh. macrorhyncha varies from the other two species in having 15 true cervical vertebræ, the 16th of the series bearing the transitional rib, whereupon follow two long pseudo-thoracic, then three true sternal, and lastly three lumbar ribs. The 23rd vertebra (in *Rhea darwini* and *americana*), but the 24th in *Rh. macrorhyncha*, is the first which is firmly ankylosed with the ilium and with the following vertebra. The same happens, however, to the next one in front in most old specimens.

The acetabular connection of the ilium with the vertebral column is effected by the 26th and, chiefly, the 27th vertebra, but in *Rh. macrorhyncha* by the 27th and 28th.

The true primitive sacral vertebræ, as determined by Gegenbaur for the avian pelvis, are in all specimens the 33rd and 34th.

In the male specimen of *Rh. darwini* the 34th nerve received no connecting branch from the 33rd, the latter therefore belonging entirely to the ischiadic plexus, just like the 34th in *Rh. macrorhyncha*. At any rate the ischiadic plexus is in all the specimens of Rhea examined by myself composed of six postacetabular spinal nerves.

Considering these facts, we conclude that the 34th vertebra is serially homologous in all the specimens as being the second primitive sacral vertebra, and it can in our comparison be looked upon as the starting point or zero, but that the whole ischiadic and crural plexuses of *Rh. macrorhyncha* are placed *one* metamere further tailwards than the corresponding portions in *Rh. darwini* and *Rh. americana*. Moreover, since the portion from the transitional vertebra to the last rib-bearing vertebra is homodynamous in all the three species (although falling under the category of parhomology or imitatory homology of Fuerbringer), we conclude rightly that *Rh. macrorhyncha* possesses one true cervical vertebra more than the other two species. This excess in number is compensated by the shortening of the number of presacral pelvic vertebræ from 6 to 5.

The number of vertebræ constituting the various regions is therefore:—

	R. darwini.	*R. americana.*	*R. macrorhyncha.*
Atlas to transitional vertebra ..	15	15	16
Vertebræ with long ribs	8	8	8
Preacetabular vertebræ without ribs	3	3	3
Number of vertebræ from acetabular to first primitive vertebra (the latter included) ..	7	7	6
	33	33	33

Makes 33 vertebræ between the occiput and the primitive intersacral nerve, which in all the three species is the 34th spinal nerve, no matter whether being at the same time the last ischiadic root, without connection with the pubic plexus as in *Rh. macrorhyncha*, or being in connection with the ischiadic plexus by a ramus communicating only and belonging chiefly to the pubic region, as in *Rh. darwini* ♀.

We have therefore to compare the series of the first 15 vertebræ of *Rh. macrorhyncha* with the first 14 vertebræ of the other two species. There can be no doubt now, that the greater number of neck-vertebræ is not produced simply by a shortening of the first pseudo-thoracic rib, as it generally happens in apparently similar cases of variation in the number of ribs, but, on the contrary, that the whole of the thoracico-lumbar region has been affected by a tailward "shifting" to the extent of one metamere; and it is also absolutely certain that the serial differences between *Rh. americana* and *Rh. macrorhyncha* have not been brought about by the inter- or ex-calation of a vertebra.

In order to determine whether *Rh. macrorhyncha* possesses a proportionately longer neck than the other species, we have to compare the length of the neck to some distance which must stand in some reasonably conceivable correlation to the former. The distance between the neck and the acetabular region appears to be rather advisable for this purpose. Again, one may fairly well suppose that in essentially terrestrial birds there might be a correlation between the length of the neck and the length of the hind limbs. However, the elevation of the trunk above the ground depends not only upon the length of the hind limbs, but also upon the angles formed by various segments of the limb to each other and to the pelvis. These considerations therefore leave the following results open to doubt. At any rate I have made the calculations, in which a certain limit of error in measuring the neck and limb must be allowed.

	R. darwini ♀.	*R. americana.*	*R. macrorhyncha.*
	centim.	centim.	centim.
Length of neck from atlas to cephalic end of transitional (14th or 15th) vertebra..	52·7	57·0	47·5
Length of femur + tibia + tarso-metatarsus.....	88·3	87·4	73·1

If the neck of *Rh. darwini* were of the same proportionate size as that of *Rh. macrorhyncha*, there ought to be

$$52{\cdot}7 : 88{\cdot}3 = 47{\cdot}5 : 73{\cdot}1$$

but

$$52{\cdot}7 \times 73{\cdot}1 = 3852{\cdot}37$$
$$88{\cdot}3 \times 47{\cdot}5 = 4194{\cdot}25$$

Since we want to know the proportion of the neck, we must leave the limbs unaltered, but shall have to increase the index for the *neck* of *Rh. darwini* in order to render the proportions of the equation correct. This would be the case if the neck of *Rh. darwini* were about 57·3 centim. long instead of 52·7. Consequently the neck of *Rh. macrorhyncha* is proportionately longer than that of *Rh. darwini*.

Again, the corresponding figures for *Rh. americana* and *Rh. macrorhyncha* are 4151 and 4191, sufficiently agreeing (considering errors of measurement) to show that the proportionate length of the necks of these two species is the same. *Rh. americana* compensates the shortness of its neck, caused by the smaller number of neck-vertebræ, by the shortness of its hind limbs.

As we come to the conclusion that *Rh. americana* has the shortest hind limbs (p. 316) we can look upon these calculations as checking each other's correctness. Whether compensation be effected also by a greater length of the single cervical vertebræ, it would be very difficult to find out.

Lastly the corresponding figures for *Rh. americana* and *Rh. darwini* are 5033 and 4606, again showing that we should have to increase the index for the neck of *Rh. darwini* to about 57·5 in order to get a correct equation. This proves beyond doubt that *Rh. darwini* has the proportionately shortest neck of the three species, and the more so because it possesses the largest hind limbs.

The length of the neck, expressed in per cent. of the whole vertebral column from the axis to the acetabular vertebra, is *Rh. darwini* 59, *Rh. macrorhyncha* 61·68, and *Rh. americana* 61·95.

It was interesting to find out whether there existed a correlation between the limbs and the neck and trunk. The following measurements show, first, that *Rh. americana* and *Rh. macrorhyncha* agree almost absolutely with each other in the proportions of their limbs to the acetabular-atlas distance; secondly, that there exists a correlation between the distances applied, unless we attribute to mere coincidence the fact that the same results are arrived at by different calculations.

	R. darwini.	*R. macrorhyncha.*	*R. americana.*
	centim.	centim.	centim.
Length of femur + tibia + metatarsus.....	88·3	73·1	87·4
Length from atlas to acetabulum	88·7	77·0	92·0

$$73{\cdot}1 \times 92 = 6725{\cdot}2$$
$$87{\cdot}4 \times 77 = 6729{\cdot}8$$

Measurements of the Limbs.

Length of	*R. americana.*	*R. macrorhyncha.*	*R. darwini* ♀.	*R. darwini* ♂.
Humerus	291	240	269	252
Ulna	216	166	188	174
Hand	119	93	116	108
2nd metacarpal	86	77	78	73
Whole wing	626	499	573	534
Femur	220	190	220	214
Tibia	330	271	330	308
Tarso-metatarsus	324	270	333	289
3rd toe	103	94	116	123
Whole hind limb	977	825	999	934
Pelvis, præantitrochant.	131	101	128	121
Pelvis, postantitrochant.	185	120	179	149
Pelvis, total length	316	221	307	270
Pelvis, from spina pubica to end of ischium	264	204	258	232

A. =100.	B. in per cent. of A.	*R. americana.*	*R. macrorhyncha.*	*R. darwini* ♀.	*R. darwini* ♂.
Humerus.	Ulna	74·4	69·1	69·8	69·0
Humerus.	Hand	40·9	38·7	43·1	42·8
Whole wing.	Hand	19·0	18·8	20·2	20·2
Whole hind limb.	Whole wing	64·1	60·5	57·3	57·2
Tarso-metatarsus	3rd toe	31·8	34·5	34·8	42·5
Whole length of pelvis.	Femur	69·6	85·9	71·9	79·2
Postantitroch. length of pelvis.	Præantitroch. pelvis	70·8	84·1	71·5	81·2

The conclusions which might be drawn from the above tables are few, and even these are not very reliable because of the different age of the specimens examined, as is apparent from the various discrepancies between the two specimens of *Rh. darwini*. With regard to the hand, *Rh. darwini* possesses the longest, *Rh. americana* the shorter, *Rh. macrorhyncha* the shortest hand; and if we combine this result with the fact of *Rh. americana* having the longest humerus in proportion to the other two species, we may fairly conclude that the wing is least rudimentary in *Rh. darwini*, in spite of its whole wing being surpassed in length by that of *Rh. americana* by about 50 millim. But of course we must bear in mind that the reduction begins at the distal end.

Again, *Rh. darwini* possesses the longest, *Rh. americana* the shortest hind limb in proportion; the weakness of the wings of the other species is therefore not compensated by a stronger development of the hinder extremities.

Concerning the toes, *Rh. macrorhyncha* agrees with the female specimen of *Rh. darwini*, both having longer toes than *Rh. americana*, whilst the male specimen of *Rh. darwini*, although not quite adult,

is remarkable for the still greater length of its toes. The proportional shortness of the toes of the Common Rhea has already been observed by Mr. Cunningham. Mr. Sclater's original statement that the toes are much shorter in his *Rh. macrorhyncha* than in the Common Rhea cannot be confirmed.

The proportions of the femur and tarso-metatarsus to each other permit of no safe conclusions, nor do the dimensions of the pelvis, owing to the considerable alterations undergone by these parts during the individual growth.

The scapula of *Rh. americana* seems to be much longer than that of *Rh. darwini*, in comparison with the coracoid, although the latter bone in Darwin's Rhea is absolutely stronger. This apparent shortness of the scapula, however, is partly produced by this bone being curved at a sharper angle in *Rh. darwini*.

Muscles.

The examination of the muscles of two *Rh. americana*, two *Rh. darwini*, and one *Rh. macrorhyncha* did not yield many interesting variations except for that most variable of all the thigh-muscles, to wit the famous m. ambiens.

In the Common Rhea this muscle was typically developed, arising from the pubic spine, and its slender tendon passing the knee to form one of the heads of m. flexor perforatus. In *Rh. macrorhyncha* the muscle arose from the latero-dorsal aspect of the pubic spine and at the same time from the big crural vein, the muscular and aponeurotic fibres of the muscle having firmly got hold of the ventral aspect of this vein. The right and left side were alike; the tendon of the muscle passed the knee in the typical way.

Rhea darwini, ♀.—The m. ambiens of either side arose from the pubic spine as usual, but its tendon, before reaching the knee, became flattened out and attached itself with a broad fan-shaped and very thin aponeurosis to the patella, in a similar style as the median additional portion of the m. femoro-tibialis (m. vastus).

Rh. darwini, ♂, left thigh. The m. ambiens stopped at the knee as in *Rh. darwini* ♀.

Right thigh.—Muscle typically developed and passing the knee with a strong and independent tendon.

This abnormal condition of the m. ambiens, which seems to be prevailing in Darwin's Rhea, is the intermediate stage between a typically developed m. ambiens and such forms in which, as in *Casuarius*, this muscle has lost still more of its independence, and then only forms an additional head of the median part of the portio media m. femori-tibialis s. vasti.—Without an elaborate examination and comparison of the formation of these muscles with their nerve-supply, we should with Garrod come to the conclusion that *Casuarius* did not possess an ambiens muscle. The assumption of still further reduction of the distal portion of the m. ambiens explains what I have observed in some Passerine birds, *e.g.* in a specimen of *Lanius bentet*, in which the m. femoro-tibialis internus, besides being strongly developed, received in its proximal part a

thin spindle-shaped semitendinous head from the pubic spine. This additional little slip is probably the last trace of the ambiens muscle, which is now generally lost by the Passerine birds.

The case above described is one way in which this muscle gets lost; in other cases, *e. g. Ciconia* and *Phœnicopterus*, the reduction does not begin by its tendon becoming attached to neighbouring tendons in the knee-region, but the whole muscle shows a diminution of its tendon and belly to a mere thread, till at last this also disappears, *e. g.* in *Abdimia* and *Xenorhynchus*.

Digestive Organs.

The digestive organs of *Rhea darwini* did not present any remarkable differences from those of *Rh. americana*, and a comparison of the relative dimensions was not advisable because of the different age of the specimens examined.

The hepatic and pancreatic ducts, together with the shape of the

Fig. 7. Fig. 8.

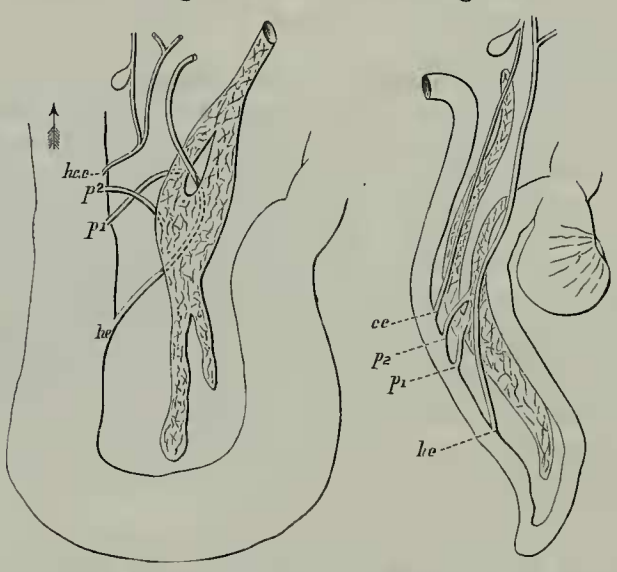


Fig. 7. *Rh. americana.* The duodenal loop and pancreas, with the first and second pancreatic ducts (p_1 and p_2), and showing the hepato-enteric duct (*he*), the cystico-enteric (*ce*), and the hepato-cystico-enteric duct (*hce*).

Fig. 8. *Rh. darwini*, ♀. The duodenal loop is represented too wide in this figure.

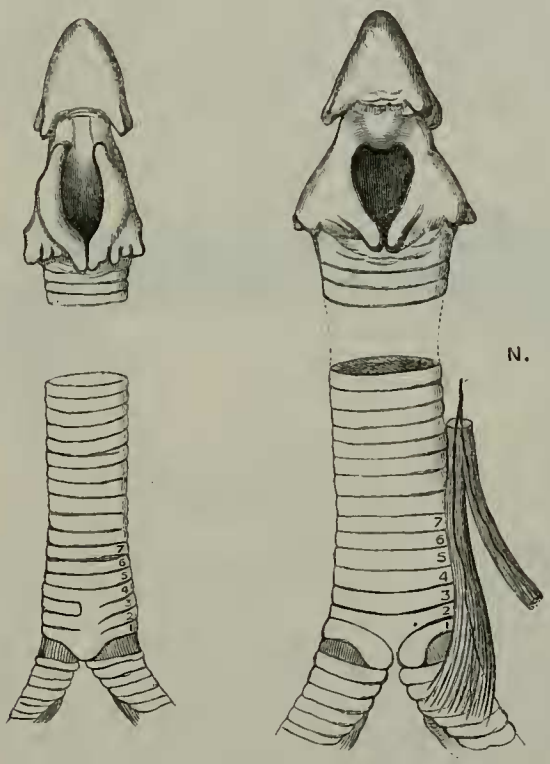
pancreas of *Rhea darwini* ♂, showed an arrangement somewhat different from that of the *Rhea americana* described by myself in the 'Jenaische Zeitschrift.' See figures 7 & 8.

Respiratory Organs.

There are some differences in the shape of the posterior margin of the upper larynx, as will be seen in the following wooducts :—

The number of tracheal rings in *Rh. macrorhyncha* is 185, in *Rh. darwini* 152; and the rings themselves are comparatively broader and thicker in the latter species, thus making up for their considerably smaller number, as the length of the whole trachea does not show any important differences in the two species. The syringeal muscle described by Forbes exists in all the specimens dissected by me; however, in level of the 9–11th last tracheal rings, the upper end of the tracheo-bronchial muscle passes into the lower end of the

Fig. 9. Fig. 10.



Rh. macrorhyncha. *Rh. darwini.*

Dorsal view of tongue, larynx, and syrinx. N, branch of hypoglossal nerve.

long m. cerato-trachealis, which runs down from the cerato-hyal along the side of the trachea. Both these muscles and the m. tracheo-sternalis are supplied by branches of the descending ramus of the hypoglossal nerve, thus leaving no doubt as to their common origin from muscles of the hyoid arches.

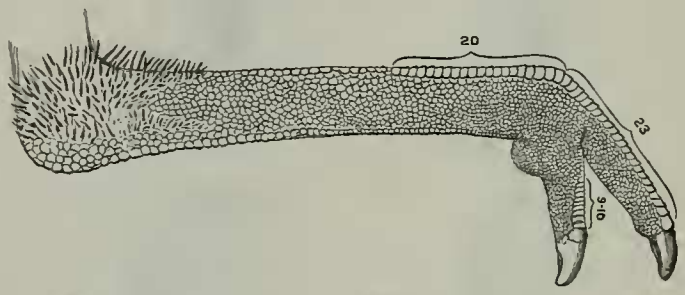
In all other respects the syrinx of my specimens of *Rhea darwini* and *R. macrorhyncha* agrees with the description given by Forbes. The slight modifications concerning the partial fusion of the last tracheal rings are easily explained by differences of age and individual variation. The same, I am sorry to say, applies to the vascular and genital systems.

Tegumentary System.

Concerning the coloration of the plumage, *Rh. macrorhyncha* is said to be distinguishable from *Rh. americana* "by its generally browner colouring, and by the darker crown, which is nearly black" (Forbes). *Rh. darwini* is characterized by its white-tipped feathers. How far these differences are subject to individual variation, and to age, is not yet satisfactorily known, owing to the scarcity of adult specimens of *Rh. macrorhyncha*.

One decidedly good distinguishing character is given by the scales and the scutellation of the metatarsus. In *Rh. darwini* the distal half of the front side of the metatarsus is covered by broad transverse scutes, numbering about 20; whilst on the proximal half, the sides, and the hinder aspect of this portion of the foot the featherless inte-

Fig. 11.



Median view of the left foot of *Rh. darwini*, diagrammatic. The outer or fourth toe is not shown.

gument is reticulated. The multangular reticulate little scutes are thickest and largest on the "heel," and are gradually decreasing in size towards the toes. The anterior dorsal surface of the toes is protected as follows:—The middle (3rd) toe is covered by 23 transverse broad scutes, which form the direct continuation of those of the metatarsus. The inner (2nd) toe possesses only about 9–10, the outer (4th) toe about 12 such scutes; these are biggest near the claws or nails, and gradually change into the reticulated structure which covers the first phalanx of the inner and outer toes.

In *Rh. americana* and *Rh. macrorhyncha* the front of the metatarsus is covered with broad transverse scutes throughout its length, like the dorsal sides of the toes. *Rh. darwini* represents in this respect, like *Dromæus* and *Casuarius*, a lower stage than either *Struthio* or the other *Rheas*, since for obvious reasons the formation of broad scutes began distally, at the toes, and worked its way proximally upwards.

Geographical Distribution.

The geographical distribution of the three species of *Rhea* known at present seems to be the following:—

Rh. americana ranges from Bolivia and the Province of Mattogrosso

(Villa Bella and Cuyabá) through Paraguay across the Paraná into Uruguay. Its headquarters appear to be the pampas of Argentina, whence it extends southwards to the Rio Negro of Patagonia.

Rh. darwini seems to be restricted to the eastern half of Patagonia and to South-eastern Argentina; about the Rio Negro of Patagonia both species occur together.

Rh. macrorhyncha has been found in the Provinces of Pernambuco and Bahia. Its north-westward and westward range is probably limited not by the Amazons and its enormous tributaries, but by the broad thick belt of forest of the Amazonian subregion. Its occurrence in Guiana is therefore improbable. As *Rh. americana* does not seem to occur in the South-eastern provinces of Brazil, "probably the barrier between the two species is a continuously wooded country [and I should add the numerous low but rough mountain-ranges] between that district and the Sertões de Bahia" (Forbes).

Summary.

The chief differences between the three species are the following :—

	Rhea americana.	*Rh. macrorhyncha.*	*Rh. darwini.*
Number of cervical vertebræ	15	16	15.
Neck	long	long	short.
Hand	shorter	shortest	longest.
Hind limb	shorter		longer.
Toes	shortest	longer	longest.
Bill	longest bill		shortest bill.
Skull	broad	narrow	broad.
Metatarsus	with transverse scutes through its length.		scutes on distal half only.
Ambiens muscle	typically developed		apparently subject to frequent modifications.
Tracheal rings		greatest number	smallest number.
General coloration of plumage		generally darker than *Rh. americana*, especially on the head.	most of the feathers with white tips.
Habitat	Southern half of South America.	North-eastern Brazil.	South-eastern South America.

This tabular arrangement shows that Darwin's Rhea differs considerably from the other two species, whilst the latter offer apparently few important characters for separation. However, no matter if the number of the neck-vertebræ of *Rh. macrorhyncha* (the best name for which would be that of the *long-necked* or *slender-headed* Rhea) be a constant character or not, the differences in the proportions of the skulls afford an anatomical character just as good as those which induce us to consider *Rh. darwini* a so-called good species. If we thus consider the three forms of Rhea as three equivalent

species, their present geographical distribution becomes less puzzling; otherwise we should expect *à priori* that the eastern form would differ more from the two others than these do from each other. Moreover, since it rarely happens that two large species of a certain order or family of creatures inhabit the same tracts of country unless they do so through immigration, it is probable that the original home of *Rh. americana* was Central South America, and that it spread from there into regions occupied by *Rh. darwini*.

April 21, 1885.

Prof. Flower, LL.D., V.P.R.S., President, in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1885:—

The total number of registered additions to the Society's Menagerie during the month of March was 94, of which 3 were by birth, 35 by presentation, 35 by purchase, 4 were received on deposit, and 17 by exchange. The total number of departures during the same period, by death and removals, was 114.

The most noticeable additions during the month of March were as follows:—

1. A female Roan Kangaroo (*Macropus erubescens*)[1], being the third specimen of this Kangaroo acquired by the Society, and the first of the female sex. During the present month we have, singularly enough, acquired a second female specimen of the same animal, along with other Kangaroos, in exchange from the Zoological and Acclimatization Society of Victoria, Melbourne.

2. Six Wattled Starlings (*Dilophus carunculatus*) from South Africa, purchased March 20th and 27th. These are the first examples we have received of this curious Starling, which is remarkable for the extreme development of the wattles in the adult male. We have specimens believed to be of both sexes, but all are in immature dress at present.

3. Two Cape Colies (*Colius capensis*), purchased March 20th. These are the first examples of this Coly yet received; they have been placed in the Parrot House along with the specimens of two other species of the same genus recently acquired, viz. *C. erythromelon* and *C. nigricollis*.

Mr. Sclater exhibited specimens of a pair of Pheasants from Bala Murghab, Northern Afghanistan, belonging to H.R.H. the Prince of Wales. Mr. Sclater was inclined to refer this bird to *Ph. insignis*, Elliot (P. Z. S. 1870, p. 404, and Mon. Ph. vol. ii. pl. 3), of which the true locality (unknown to Mr. Elliot) was thus established. Mr. Elliot's skins were without heads, but Mr. Elliot had correctly

[1] Cf. P. Z. S. 1870, p. 216, pl. x., and p. 368; P. Z. S. 1871, p. 240.